PATENT SPECIFICATION (11) 1 395 013

1 395 013

(21) Application No. 54002/72 (22) Filed 22 Nov. 1972 (19)

(23) Complete Specification filed 7 Nov. 1973

(44) Complete Specification published 21 May 1975

(51) INT. CL.² F28F 3/02

(52) Index at acceptance
F4S 4B 4E1A 4E1B 4G

(72) Inventor FELIX WILLIAM WRIGHT

(54) IMPROVEMENTS IN OR RELATING TO PLATE HEAT EXCHANGERS

(71) We, THE A.P.V. COMPANY LIMITED, a British Company, of Manor Royal, Crawley, Sussex, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to plate heat exchangers.

A plate heat exchanger normally consists of a separable pack of plates supported and pressed together in a frame. The plates have aligned apertures to define supply and discharge ports for two heat exchange media and are provided with peripheral gaskets to define flow spaces on the plates and control the flow between the ports and the flow spaces. The areas of the plates within the flow spaces are normally provided with turbulence promoting corrugations.

In the type of heat exchanger to which the present invention describes, the turbulence promoting corrugations on adjacent plates cross and abut to provide inter plate support as well as creating considerable turbulence in the flowing liquids to increase heat transfer.

According to the present invention there are provided, in some or all of the corrugations, additional turbulence promoting elements extending along the corrugations at locations clear of the points where the corrugations cross and abut.

The turbulence promoting elements may be individual elements in the corrugations or they may together form a mesh or other composite structure.

In one particular form of the invention, the turbulence promoting elements are rods or bars extending along some or all of the corrugations of both sets and joined together where they cross to form a mesh.

In an alternative form of the invention, expanded metal of an appropriate pitch and angle may be used.

The invention will be further described with reference to the drawing accompanying the Provisional Specification, which drawing shows preferred embodiments of the invention, and in which:—

Figure 1 is a perspective cut away view of portions of two adjacent plates, with a composite structure of turbulence promoting elements between them; and

Figure 2 is a similar view showing individual turbulence promoting elements.

Turning now to Figure 1, there are shown portions of two heat exchanger plates 1 and 2 of which the corrugations cross and abut to give interplate support at closely spaced points within the flow space zone. In the portions illustrated, all of the corrugations of each plate contain rods 1*a* and 2*a* respectively so that the rods 1*a* are carried clear of the plate 2, and vice versa. The rods are joined together at the points where they cross to form a mesh structure which may be lifted clear of the plate surfaces when the heat exchanger is opened up for cleaning.

If the duty does not require the utmost turbulence, then some of the rods 1*a* and/or 2*a* could be omitted, thus providing a mesh of greater pitch or even or irregular pitch, provided that the pitch is such as to enable the rods to fit into the corrugations. The ends of the rods, or some of them, would be arranged for lodgement appropriately in end formations of the corrugations or attachment to the gaskets.

Figure 2 shows a modified version in which individual turbulence promoting elements 3 run parallel with some or all of the corrugations of the plate 1, and are in the form of twisted strips adapted to lay flat on the corrugations of the plate 2 and to have their twists between these corrugations so as to present a maximum turbulence promotion where the flow passage is at its maximum dimension. The elements 3 may be attached by spot welding or otherwise to the plate 2, or they may be secured at their ends by appropriate mechanical location.

Various modifications may be made within the scope of the invention. For instance, the mesh of Figure 1 may be replaced by an expanded metal structure with the apertures

in the expanded metal corresponding with the points of crossing and abutting of the plates 1 and 2.

WHAT WE CLAIM IS:—

1. A plate heat exchanger comprising a separable pack of gasketed plates having turbulence promoting corrugations, the corrugations on adjacent plates crossing and abutting to provide interplate support, comprising, in some or all of the corrugations, additional turbulence promoting elements extending along the corrugations at locations clear of the points where the corrugations cross and abut.

2. A plate heat exchanger as claimed in claim 1, in which the additional turbulence promoting elements are individually separate.

3. A plate heat exchanger as claimed in claim 2, in which the additional elements are in the form of twisted strips extending within the corrugations of one plate of a pair of adjacent plates and across the corrugation of the other plates of the pair, and laying flat on the corrugations of the said other plate, with twists between the corrugations.

4. A plate heat exchanger as claimed in claim 3, in which the strips are attached to the corrugations of the said other plates.

5. A plate heat exchanger as claimed in claim 1, in which the additional elements in a flow space between a pair of adjacent plates form a mesh or other composite structure.

6. A plate heat exchanger as claimed in claim 5, in which the additional elements are in the form of rods or bars extending along some or all of the corrugations of both sets and joined where they cross to form a mesh.

7. A plate heat exchanger as claimed in claim 5, in which the additional elements are formed of expanded metal.

8. A plate heat exchanger substantially as hereinbefore described with reference to and as shown in Figure 1 or Figure 2 of the drawing accompanying the Provisional Specification.

MARKS & CLERK,
Chartered Patent Agents,
57 & 58 Lincoln's Inn Fields,
London, WC2A 3LS.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1975.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

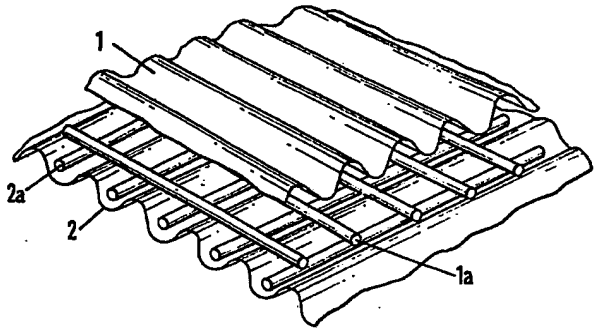

FIG.1.

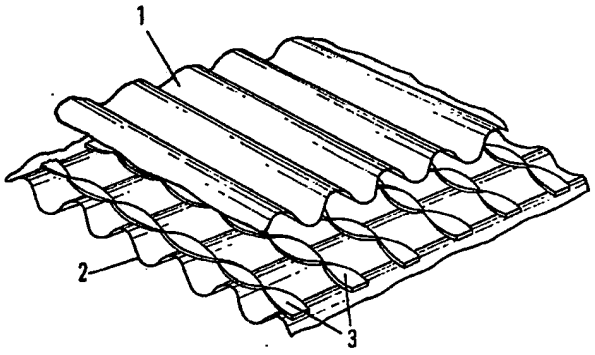

FIG.2.